

Several vitamins, minerals (green leafy [vegetable](#) ingredients) and herbs have been used in an attempt to treat or prevent the development of [cataract](#), [glaucoma](#), macular degeneration and diabetic retinopathy. Although anecdotal evidence abounds, the lack of large scale controlled trials make definite recommendations difficult. This is not surprising since most of the aging eye diseases progress slowly and a multitude of factors (genetic and environmental) affect their development and progression, so that it becomes very difficult to isolate the influence of a specific vitamin or mineral on this process. On this page we discuss the nutrients that over time have been suggested to play a possible role.



In the absence of specific contraindications and side effects, most physicians seem it reasonable to use these nutrients as an adjunct to specific medical therapy - i.e. "can't hurt and might help" approach. Perhaps the most reasonable recommendation would be to increase the dietary intake of green leafy vegetables (for Carotenoids) and fruits & vegetables like carrots and cantaloupe which have reddish pigment (for beta-Carotene). There is a risk however. Patients affected by these diseases are willing to grasp at any straw in desperation, because in advanced disease medical therapy seems to offer so little hope. This is especially true for macular degeneration and glaucoma. Therefore, despite claims of cure with expensive alternative treatments, refrain from unreasonable expectations is prudent.

There is concern about eating green leafy vegetables if you are on Warfarin (Coumadin), a blood thinner. Warfarin reduces the ability of blood to clot by blocking Vitamin K; however, large amounts of Vitamin K can overcome the effects of warfarin. Green leafy vegetables are high in vitamin K. According to the National Stroke Association, patients taking Warfarin do not need to avoid foods that are high in vitamin K-- rather, they should avoid abruptly changing the amount of vitamin K-rich foods consumed since the changes in vitamin K intake can alter the effect of warfarin, making warfarin ineffective (too much vitamin K in the diet) or causing bleeding (too little vitamin K in the diet). If you eat a relatively constant amount of green vegetables then Warfarin levels would be unlikely to fluctuate.

Vitamin C, Vitamin E, beta-Carotene (pro-Vitamin A) and Carotenoids (Lutein & Zeaxanthin) are strong antioxidants i.e. they protect the eye against free radical damage. It seems reasonable to assume that strengthening of the eye defences by increasing the intake of these vitamins would be helpful in preventing the chronic AgingEye diseases. Recent well designed and controlled studies seem to support this assumption. Lycopene (a different type of carotenoid found in tomatoes) protects against prostate cancer and heart disease - therefore the protective effect of these vitamins is not just restricted to the eye. (Read or print the AOA Antioxidant [brochure](#)).

● Nutritional supplements and Macular Degeneration

The [Age-Related Eye Disease Study](#) (AREDS) was a major study sponsored by the National Eye Institute (NEI). In the study, scientists looked at the effects of zinc and antioxidants (vitamin C, vitamin E & beta carotene i.e. provitamin-A), on patients with cataracts and age-related macular degeneration (AMD). Lutein was not part of this study because during the planning stages in the early 1990s, lutein and zeaxanthin were not commercially available.

The study showed a number of important things: High levels of antioxidants and zinc can reduce the risk of vision loss from advanced macular degeneration by about 19% (see [graph](#)). Vitamin supplements do not provide as much benefit to patients with minimal macular degeneration. These nutritional supplements do not prevent the development of macular degeneration, nor can one recover vision already lost to macular degeneration. In this study, nutritional supplements do not seem to prevent cataracts, or to keep them from getting worse over time, although other studies have shown

such a beneficial affects.

While most patients in the study experienced no serious side effects from the doses of zinc and antioxidants used, a few taking zinc alone had urinary tract problems that required hospitalization. Some patients taking large doses of antioxidants experienced some yellowing of the skin. The long-term effects of taking large doses of these supplements are still unknown.

If you have intermediate (or advanced macular degeneration in one eye only), talk to your physician about taking nutritional supplements. Your doctor can help you determine if they may be beneficial-and safe-for you, and what types and doses of supplements to take. The doses used in the study were: Vitamin C 500 mg, Vitamin E 400 IU, Beta-carotene 15 mg, Zinc 80 mg, as zinc oxide, Copper 2 mg, as cupric oxide (copper should be taken with zinc, because high-dose zinc is associated with copper deficiency). Read or print the AOA Macular degeneration & Nutrition [brochure](#). To know more about the NEI macular degeneration study read or print the NIH [News Release](#) about this study or view the [video](#).

It is very important to talk with your physician before taking large-dose supplements, and to follow the dosage recommendations carefully. Megadoses of vitamins have well defined health risks. Some supplements may interfere with each other or other medications. **Smokers and ex-smokers probably should not take beta-carotene, as studies have shown a link between beta-carotene use and lung cancer among smokers.**

Vitamin Supplements for Macular degeneration Patients	
<p>AREDS Formula (FAQ) Note: AREDS formula contains beta-carotene which can increase the risk of lung cancer in smokers or ex-smokers.</p>	<p>Ocuvite PreserVision by Bausch & Lomb Icaps AREDS Formula by Alcon ProtectRx by ScienceBased Health VisiVite Original Formula by VisiVite Viteyes Original Formula by Vitamin Health, LLC</p>
<p>AREDS Formula minus beta-carotene (This formula is safe for smokers or ex-smokers. It provides all AREDS vitamins except beta-carotene)</p>	<p>Retinavites Smoker's Formula VisiVite Smoker's Formula (has lutein) Viteyes Smoker's Formula (has lutein & zeaxanthin) MaculaRx Plus (has 1/10th AREDS beta-carotene dose)</p>
<p>Lutein and/or Zeaxanthin Formulas (AREDS formula does not have carotenoids as the study did not evaluate them.)</p>	<p>Ocuvite Lutein ICaps Lutein & Zeaxanthin Formula ZeaVision (3 mg or 10 mg)</p>

● **Nutritional supplements and Cataracts**

Compared with nonusers, the risk for cataract is 60% lower among persons who use multivitamins or any supplement containing vitamin C or E for more than 10 years. Use of vitamins for shorter duration is not associated with reduced risk for cataract (*Arch Ophthalmol* 2000;118:1556-63). Vitamin C reduces the risk of cortical cataracts in women aged 60 years or less & carotenoids reduce the risk of posterior subcapsular cataract (PSC) in women who have never smoked (*Am J Clin Nutr* 2002;75:540-9). A recent research report also suggests that lutein and zeaxanthin (the only carotenoids found in the lens) may retard aging of the lens (*Arch Ophthalmol* 2002;120:1732-7). Higher intakes of protein, vitamin A, niacin, thiamin, and riboflavin (i.e. vitamin B-complex) are associated with reduced prevalence of nuclear cataract (*Ophthalmology* 2000;107:450-6).

The combined weight of the evidence suggests that long-term use of vitamin supplements (containing vitamin-C, E and [carotenoids](#)) may be of value in delaying cataract development.

Years ago, Nobel laureate Linus Pauling advocated megadoses (1,000 to 2,000 mg per day) of Vitamin C to fend off colds and prevent cancer. Studies have found no benefit from such massive doses of vitamin C, but a different line of research suggests that just a little extra might be a good thing for [women's eyes](#). Any protective effect of vitamin C probably occurs well above the Recommended Dietary Allowance (RDA) of 75 mg/day for women, about the amount in an orange (Women who smoke need more vitamin C 110 mg/day).

Research by the Nutrition and Vision Project (NVP), a cooperative effort of Harvard and Tufts University scientists, has found that women who consume higher-than-recommended doses of vitamin C may lower their risk for more than one type of cataract (*Harv Womens Health Watch* 2002;9:1). Boosting the vitamin C intake from both food and supplements to around 500 mg/day is probably a good idea, however discuss it with your doctor, especially if you have an increased risk for kidney stones.

Read or print the AOA [Cataract & Nutrition brochure](#)

● **Lutein & Zeaxanthin role in Eye Disease Prevention**

The macula is yellow in color due to the presence of pigment, which is composed of two dietary carotenoids, lutein and zeaxanthin. By absorbing blue-light, lutein and zeaxanthin pigments protect the photoreceptor cells of the retina from light damage. In addition, lutein & zeaxanthin are antioxidants, able to prevent free-radical damage to the macula. If the macula has more lutein and zeaxanthin, the protection against light damage is also greater. The macular pigment can be increased in by either increasing the intake of foods that are rich in lutein and zeaxanthin, such as dark-green leafy [vegetable](#), or by supplementation with lutein and zeaxanthin.

While the assumption that increasing the intake of lutein or zeaxanthin may protect against the development of age-related macular degeneration has a strong scientific basis, a causative relationship has yet to be unequivocally demonstrated in rigorous controlled studies. Given the evidence to date, the advice to increase the intake of lutein & zeaxanthin seems reasonable

A number of studies intended to examine trends in a population suggest a link between lutein and decreased risk of eye disease:

- In 1994, a National Eye Institute (NEI)-supported study indicated that consumption of foods rich in carotenoids -- particularly green, leafy vegetables such as collard greens, kale, and spinach -- was associated with a reduced risk of developing macular degeneration.
- In 1999, data from the Nurses Health Study showed a reduced likelihood of cataract surgery with increasing intakes of lutein and another carotenoid --zeaxanthin.
- In 1999, the Health Professionals Follow-up Study found a trend toward a lower risk of cataract extraction with higher intakes of lutein and zeaxanthin.
- In 1999, a follow-up to an NEI-supported population-based study -- called the Beaver Dam Study -- concluded that people with diets higher in lutein and zeaxanthin had a lower risk of developing cataract.
- In 2001, data from the Third National Health and Nutrition Examination Survey reported that higher intakes of lutein and zeaxanthin among people ages 40-59 may be associated with a reduced risk of advanced macular degeneration.

Lutein & Zeaxanthin were not part of this AREDS (macular degeneration study) because during the planning stages in the early 1990s, lutein and zeaxanthin were not commercially available. Therefore, the recently released results of the macular degeneration study could not advice on lutein. At present the National Eye Institute is conducting a [clinical trial](#) to determine the role of lutein on eye health.

It seems reasonable to conclude that the trends and available evidence to date supports a beneficial affect for lutein in preventing eye diseases. The [Lutein Information Bureau](#) website has extensive information on lutein. Read or print the AOA [lutein & Zeaxanthin brochure](#). The [Zeavision](#) website has information on Zeaxanthin and available formulations.

Since it can be challenging to know if and how much of these nutrients your diet is providing, the American Optometric Association, has set up an [Online Dietary Risk Assessment Quiz](#). Their assessment quiz is adapted from the National Cancer Institute's Diet History Questionnaire, which uses nutrient intake data from both the U.S. Department of Agriculture and the University of Minnesota's Nutrition Data System for Research.

The National Cancer Institute recommends five fruits and vegetables daily (read or print the ["High Five" brochure](#)).

● Herbs and Aging Eye Diseases

The use of herbal supplements in the US has become increasingly popular in recent years. In a survey conducted in 1999, about 49% of adult Americans were estimated to have used herbal products during the previous year (*Journal of Clinical Pharmacy & Therapeutics* 2002;27:391-401). Contributing to their increased use is the perception that herbs are safer, gentler and represent a more 'natural' way of curing disease than conventional drugs, which are viewed as chemicals.

These medications fall into the category of alternative/complementary medicines and, as such, are not regulated by the Food and Drug Administration (FDA) with the same scrutiny as conventional drugs. There is no pre-marketing review and post-marketing surveillance requirements for herbal supplements in the US. Their regulation by the FDA is restricted as a result of the Dietary Supplement Health and Education Act (DSHEA) passed by US Congress in 1994. These products are freely available to consumers as over-the-counter (OTC) items. The FDA has now established standards to ensure that dietary supplements and dietary ingredients are not adulterated with contaminants or impurities, and are labeled to accurately reflect the ingredients in the product ([News Release](#)). There is still no requirement to show that dietary supplements are safe or effective.

As the use of herbal supplements in the US continues to grow under the prevailing scenario, some concerns have become apparent regarding the safety of these products. Of particular safety concern is potential interactions of these products with conventional drugs. It has been documented that as many as 31% of the patients who use herbal supplements do so in conjunction with prescribed drugs and about 70% of these patients do not regularly report the use of these products to their health care providers (*Journal of Clinical Pharmacy & Therapeutics* 2002;27:391-401). **Of most concern is the bleeding tendency when herbs like Ginkgo are taken along with aspirin or other blood thinner.**

● Bilberry (*Vaccinium myrtillus*)

Bilberry has a long history of use for various eye conditions. The active components, flavonoid anthocyanosides, are potent antioxidants with a particular affinity for the eye and vascular tissues. Interest in bilberry was first aroused during World War II when British Royal Air Force pilots reported improved night visual acuity on bombing raids after consuming bilberries. Subsequent claims have been made that the administration of bilberry extracts results in improved night visual acuity, quicker adjustment to darkness and faster restoration of visual acuity after exposure to glare. In a report of 50 patients with age-related cataracts, a combination of bilberry and vitamin E delayed the progression of cataracts (*Head K. Altern Med Rev* 2001;6:141-166).

Bilberry has been used in the treatment of glaucoma as well.

● Ginkgo Biloba

Ginkgo biloba extract is freely available and popular. An extract of Ginkgo leaves is commonly used for conditions associated with cerebral and peripheral ischaemia (e.g. dementia, impotency, claudication). Ginkgo has several biological actions which combine to make it a potentially useful agent in the treatment of glaucoma: improvement of central and peripheral blood flow, reduction of vasospasm, reduction of serum viscosity, antioxidant activity, platelet activating factor inhibitory activity, inhibition of apoptosis, and inhibition of excitotoxicity. The effect of Ginkgo biloba extract as a potential antiglaucoma therapy is undergoing scrutiny.

Bleeding may occur inside the eye in patients taking Ginkgo (*N Engl J Med* 1997 10;336:1108). One of its components, ginkgolide B, is a potent inhibitor of platelet-activating factor, which is essential for the induction of arachidonate-independent platelet aggregation. Bleeding complications in the brain have also been reported.

A recent [research article](#) suggests that Ginkgo biloba extract (40 mg, orally, administered three times daily for 4 weeks) improves preexisting visual field damage in some patients with Normal Tension Glaucoma (*Ophthalmology* 2003;110:359-362). Visual field improvement theoretically could result from improved retinal ganglion cell function or improved cognitive abilities. Either of these effects could occur secondary to improved blood flow to the eye, the brain, or both to a neuroprotective effect of Ginkgo Biloba. Further studies are needed to determine by what mechanisms Ginkgo may benefit patients with glaucoma.

● **Coleus Forskohlii**

The triterpene forskolin from the plant *Coleus forskohlii* stimulates the enzyme adenylate cyclase. Adenylate cyclase then stimulates the ciliary epithelium to produce cyclic adenosine monophosphate (cAMP), which in turn decreases eye pressure by decreasing aqueous humor inflow.

Results of studies using topical forskolin applications to decrease eye pressure have been mixed. To date, human studies on forskolin's effect on eye pressure have been limited to healthy volunteers. Several studies have found it effective at lowering eye pressure and decreasing aqueous outflow in healthy volunteers.

● **Salvia Miltiorrhiza**

Salvia miltiorrhiza is a commonly used botanical in Chinese medicine. Injected intravenously, this botanical appears to improve microcirculation of the retinal ganglion cells.

In a human study, 121 patients with mid- or late-stage glaucoma with medication-controlled eye pressure received daily intramuscular injections of a 2 g/mL solution of *Salvia miltiorrhiza* alone or in combination with other Chinese herbs (four different groups). The results suggest a possible benefit from this herbal treatment. Double-blind evaluations of oral administration of *Salvia* seem warranted.

● **Wine and Macular Degeneration**

Researchers reported in *Journal of the American Geriatrics Society* that people who drink wine in moderation may be less likely to develop age-related macular degeneration (AMD). This finding was based on an analysis of data collected between 1971 and 1975 for the National Health Nutrition and Examination Survey (NHANES-1) from 3,072 adults 45 to 74 years of age with eye-related changes that indicated AMD.

The National Eye Institute (NEI) believes that it would be premature to make any recommendations based on this single study. While this is an interesting finding that bears further investigation, the authors warn that the study should not be used to "draw inferences about a cause and effect relationship." It also should be noted that later studies have found no such relationship between AMD and wine drinking, and that the findings reported are of borderline significance.

The NEI agreed with the author's concerns about the reliability of the data indicating the amount of alcohol consumed, as these data are often subject to recall bias. In addition, the study did not completely take into account possible confounding factors, especially smoking. Many studies show that smoking is a risk factor for AMD. Since there is generally more smoking among alcohol users, smoking status should be taken into account in the analyses. NEI questioned, too, the reliability of the diagnosis of AMD in those surveyed. The methods used now to diagnose AMD in large studies have been improved and are quite different than those used in the early 1970's.

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